21. (Once amended) The missing part detector system of claim 19, in which the workpiece is a parallel-link chain, the missing parts are links in the chain, and there are two bar code readers, one each to scan guide row and non-guide row links of a chain.

Rewrite claim 26 to read, in its entirety:

26. (Once Amended). The missing part detector system of claim 19, wherein the signal processing circuit utilizes mathematical integration of an output signal from said light sensitive array and calculates an area under a measured output curve, and the reference is a voltage.

REMARKS

The office action of January 2, 2003, has been reviewed and its contents carefully noted. Reconsideration of this case, as amended, is requested. Claims 1 through 30 remain in this case.

Preliminary Comments

a. The numbered paragraphs below correspond to the numbered paragraphs in the Office Action.

b. Claim 1 was amended in step (d) to clarify that it is a reference *signal* which is compared to the processed *signal.*

c. Claim 1p was amended to clarify that it is a reference *signal* which is compared to the processed *signal.*

d. Claims 21 and 26 were amended to correct typographical errors, as suggested by the Examiner.

Claim Objections

1. Claims 21-23 were objected to by the instant Office Action because of the following informalities: claims 21-23 are dependent claims of claim 18 which depends on independent claim 1. The examiner suggested amending the dependency of claim 21 from 18 to 19 to overcome the objection.

Applicant thanks the Examiner for pointing out the above typographic error, and the correction has been made as suggested. Claim 21, as amended, is now dependent upon claim 19. Reconsideration and withdrawal of the objections are respectfully requested.

Rejection(s) under 35 U.S.C. §112

3. Claim 26 was rejected on the grounds that it recites the limitation "said diode array" in line 2. The Examiner stated that there is insufficient antecedent basis for this limitation in the claim.

Applicant appreciates the Examiner pointing out the above. Claim 26, as amended, is directed toward "said light sensitive array". The antecedent basis for this phrase appears in claim 19(b), upon which claim 26 depends. Applicant believes that these amendments have fully addressed the Examiner's rejections, and the claims are now in condition for allowance. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection(s) under 35 U.S.C. §102

5. Claims 1, 3-20 and 24-30 were rejected under 35 U.S.C. 102(b) as being anticipated by Saka et al. (USP 5,434,792). Applicant respectfully disagrees.

Claim 1, as amended, recites as follows:

1. A method of detecting **missing parts in a workpiece comprising a plurality of parts,** comprising the steps of:

a) **moving** the workpiece **relative to a bar code reader**;

b) **detecting a line image** across the workpiece with the bar code reader, **producing a signal output representative of the line image**;

c) deriving a processed signal from the signal output of the bar code reader;

d) **comparing the processed signal to a reference signal representing a workpiece without missing parts**; and

e) indicating if the processed signal does not match the reference.

(emphasis added)

Claim 19, as amended, is a parallel apparatus claim to method claim 1. The arguments given below in connection with claim 1 apply equally to claim 19.

The instant Office Action alleges that:

> "Re claims 1, 3, 5-9, 14-20, 24-26, 29 and 30, Saka et al. discloses a production system including a method of detecting **missing parts in a workpiece** comprising a plurality of parts (col. 1, lines 65+) comprising the steps of:
>
> a) **moving** the workpiece relative to a bar code reader (col. 3, lines 66-68 and the workpiece may be a plurality of parts in a container as disclosed in col. 3, lines);
>
> b) detecting a **line image** *across the workpiece* with the bar code reader (col. 4, lines 35-40) producing a signal output representative of the line image (col. 4, lines 41-42);
>
> c) deriving a processed signal (a control unit 13 and a line host controller 16) from the signal output of the barcode reader (col. 4, lines 41-42);
>
> d) comparing the processed signal to **a reference** (work order sheet) **representing a workpiece without missing parts** (col. 4, lines 1-13);
>
> e) indicating if the processed signal does not match the reference (col. 4, lines 43-54).
>
> The detecting process is accomplished by reading a **barcode label** on a product or an ID card attached to a **product or a pallet** moving along a direction of a conveyer belt by a reader which inherently comprises a light emitting element and a reflected light-detecting unit (usually an array of photodiodes). In addition, an operator controls the start-stop motion of the conveyor belt according to the data read by a reader (col. 4, lines 10-13)."(emphasis added)

Saka teaches a production management system for supplying work order sheets to personnel in a production line, and of transmitting defective product data at each working process to a quality control system. The production system comprises assembling sites and testing sites for testing and inspecting the performance or the quality of an assembled product, at least one line terminal installed at each of the assembling sites and the testing sites, **an ID card attached to a product to match the flow of an article and manufacturing data, including a type and a parts number for each product,** while being transported, a line host controller that reads the data from the ID card via the line terminals, outputs work order sheets for operators via

the line terminals, outputs a test result report containing test-inspection record data for each product, and outputs a delivery order sheet for preparation packing to a packing site via a Local Area Network, and a line host control terminal connected to the line host controller.

The first step in Applicant's claim 1 (a) claims moving the **workpiece** relative to a bar code reader, not moving a **barcode** relative to a barcode reader. The Applicant does not claim to have invented moving something bearing a barcode past a barcode reader - that is how barcode readers have been used for many years. To the extent that Saka teaches use of a bar code reader, it is the standard reading of information represented by a bar code relating a product. No bar code is involved in Applicant's independent claims 1 or 19.

The method of Applicant's claim 1 then performs the step of (b) **detecting a line image across the workpiece with the bar code reader, producing a signal output representative of the line image.** The Office Action cited (col. 4, lines 35-40) and (col. 4, lines 41-42) as relevant. However, these sections clearly state that the testing or line terminal "reads the product code and the control number from the ID card..." Clearly, Saka is teaching using a bar code reader to read bar codes, producing an output which is the information encoded in the bar codes - just what bar code readers are always used for.

Finally, the method of Applicant's claim 1 performs step (d) of **comparing the processed signal to a reference signal representing a workpiece without missing parts.** Saka reads barcodes on parts to determine what parts are present, then compares the list of parts present to another list of parts which should be present. Saka does not teach or suggest **detecting a line image** and **producing a signal representative of the image.** Not having a line image, or a signal representative of the line image, Saka cannot and does not **compare the processed signal to a reference signal representing a workpiece without missing parts.**

It cannot be stressed too strongly that the instant application does not contemplate using bar codes on a workpiece to detect missing parts. The claimed *line image created by the barcode reader* is not a read barcode, but rather represents the *physical aspects or characteristics of a work piece* as it is moved past the reader. A line image is not a bar code, and a signal representing a line image is not a list of parts. A work order sheet is not a **reference signal representing a workpiece without missing parts.**

Furthermore, the Examiner in the instant Office Action admits that Saka teaches:

"[t]he detecting process is accomplished by reading a **barcode label** on a product or an ID card attached to a **product or a pallet** moving along a direction of a conveyer belt by a reader which inherently comprises a light emitting element and a reflected light-detecting unit (usually an array of photodiodes). In addition, an operator controls the start-stop motion of the conveyor belt according to the data read by a reader (col. 4, lines 10-13)."(emphasis added)

Because there is no **barcode label** contemplated by the instant application, the Examiner's admission is evidence that Saka does not contemplate claim 1 of the instant application.

With regard to independent apparatus claim 19, please refer to the arguments put forward in relation to method claim 1. With claims 1 and 19 allowable, claims 4, 10-13, 27 and 28, by virtue of their dependency to claims 1 and 19, are deemed patentable.

In addition, with regard to claim 10, a 'linear image' is not a bar code, and the number derived from the processed linear image is, as is clear from Applicant's specification, a binary number representing physical characteristics of the workpiece, not a detected and interpreted barcode. With regard to claim 12, deriving a number from counting level transitions in a linear image is not reading and decoding a barcode. With regard to claim 13, deriving a binary number in which each bit represents a detection or non-detection of a part on a workpiece is not taught or suggested by Saka's reading a bar code to derive a decimal number which is compared to a list.

Therefore, it is respectfully suggested that the rejection of independent claims 1 and 19 as being anticipated by *Saka* is overcome. Dependent claims 4, 10-13, 27 and 28, (as well as other dependent claims not discussed specifically by the instant Office Action but is included in this rejection), being dependent upon and further limiting independent claims 1 and 19, should also be allowable for that reason, as well as for the additional recitations they contain. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection(s) under 35 U.S.C. §103

7. Claims 2 and 21-23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ledvina et al. (USP 4,509,323) in view of Saka et al. (USP 5,434,792). Applicant respectfully disagrees.

The Office Action states:

> "Ledvina et al. discloses a parallel-link chain (Fig. 2) having two types of links with a distinguishable physical characteristic from each other. He discloses the links are painted with different colors (selecting colors are designers choice but it would be obvious to select colors distinctive to each other. One of ordinary skills in the art preferably selects a dark color such as black to minimize noise in detecting a reflected light.) and illuminated by a light. An optical detector detects the reflected light and examines for the appropriate color spectrum. Then the link type is verified (page 3-4, (6) of the description of the preferred embodiments)."

In making the rejection, the Examiner further states that "In view of Saka et al, it would have been obvious... to further incorporate a method of reading a bar-code label to identify a missing part ..." Applicant respectfully points out that rather than making the present invention obvious, this points out the very point of difference between Saka and the Applicant's invention, as discussed above: the present invention *does not use bar codes* to identify the parts, but rather *uses a barcode reader to derive a signal representative of a line image* across the workpiece.

As the Examiner says, Ledvina et al. discloses a parallel-link chain (Fig. 2) having two types of links with a distinguishable physical characteristic from each other. Ledvina's two types of links are used so that the noise signature of the chain is reduced by the differently shaped links hitting the sprockets at different times - this is the basis of the "silent" chain. The particular arrangement of types of links can be very important in making a chain for a particular application, to avoid annoying resonances, so Ledvina's invention is a method of distinguishing each of the types of links by back shape or color, and reflecting a light off the links to make sure that the chain was assembled with the correct pattern of links. The reflected light from the links is compared, set by set, to the expected pattern of links, and the chain stopped if the expected pattern is not found (see Ledvina, column 3 line 57, through column 4 line 27). Nowhere in Ledvina is it taught or suggested to detect a missing part in a workpiece by comparing a signal derived from a line image of the entire workpiece to a reference signal indicative of the

workpiece without missing parts. As discussed above in connection with the section 102 rejections, which argument is incorporated here by reference Saka does not show this method or apparatus either.

If neither reference shows the invention, the combination of the two (even if possible) cannot make the invention obvious. Applicant respectfully suggests that Saka et al and Ledvina et al are not combinable in that Saka teaches an assembly line for producing small quantity products, in which missing parts are found by scanning barcoded ID tags attached to parts and comparing the list of scanned ID tags to a reference list, and Ledvina teaches a modifying a silent chain with two different kinds of links by changing the reflective characteristics of the backs of the links.

Even if the above two are combinable, which the Applicant disagrees, the resultant system would either be a silent chain with ID tags attached to each link, in which a barcode reader reads the tags and compares the read tag information to a list of the links which should be present, or a system in which the parts in a product are modified to be in two different colors or shapes.

Therefore, Applicant respectfully disagrees with the Examiner in regard to the instant rejection, and believes the claims 2 and 21-23 are patentable over Ledvina et al and Saka et al , individually and in combination, for the reasons given above.

Reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion

Applicant believes the claims, as amended, are patentable over the prior art, and that this case is now in condition for allowance of all claims therein. Such action is thus respectfully requested. If the Examiner disagrees, or believes for any other reason that direct contact with Applicants' attorney would advance the prosecution of the case to finality, he is invited to telephone the undersigned at the number given below.

"Recognizing that Internet communications are not secured, I hereby authorize the PTO to communicate with me concerning any subject matter of this application by electronic mail. I understand that a copy of these communications will be made of record in the application file."

Respectfully Submitted:
Mark E. Patton

By:_____

Frank F. Tian, Registration No.46462
Agent for Applicant
BROWN & MICHAELS, P.C.
400 M&T Bank Building - 118 N. Tioga St.
Ithaca, NY 14850
(607) 256-2000 • (607) 256-3628 (fax)
e-mail: tian@bpmlegal.com
Dated: February 27, 2003

APPENDIX OF AMENDED CLAIMS

The following are the claims in this case, as amended to date, showing changes made by this response:

1. (amended) A method of detecting missing parts in a workpiece comprising a plurality of parts, comprising the steps of:

a) moving the workpiece relative to a bar code reader;

b) detecting a line image across the workpiece with the bar code reader, producing a signal output representative of the line image;

c) deriving a processed signal from the signal output of the bar code reader;

d) comparing the processed signal to a reference signal representing a workpiece without missing parts; and

e) indicating if the processed signal does not match the reference.

19. A missing part detection system for detection of missing parts in a workpiece having a plurality of parts, comprising:

a) a light source for illuminating the workpiece; and

b) a light sensitive array for detecting a line image of the workpiece, produced by said light source, having a signal output representative of the detected line image; and

c) a signal processing circuit having an input coupled to the signal output of the light sensitive array, and an output, such that the signal output of the light sensitive array is compared to a reference signal representative of a complete workpiece without missing parts, and the output of the signal processing circuit producing a signal when the comparison indicates a part is missing.

21. (amended) The missing part detector system of claim [18] 19, in which the workpiece is a parallel-link chain, the missing parts are links in the chain, and there are two bar code readers, one each to scan guide row and non-guide row links of a chain.

26. (amended) The missing part detector system of claim 19, wherein the signal processing circuit utilizes mathematical integration of an output signal from said light sensitive [diode] array and calculates an area under a measured output curve, and the reference is a voltage.